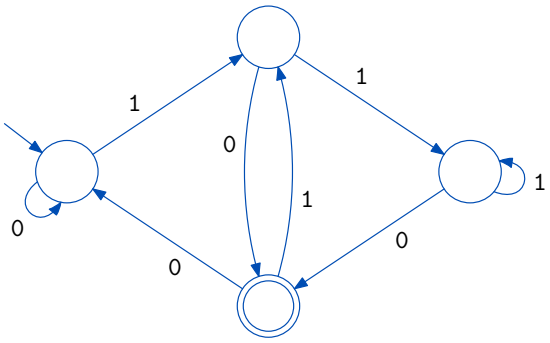
Supplemental Questions on: Finite Automata

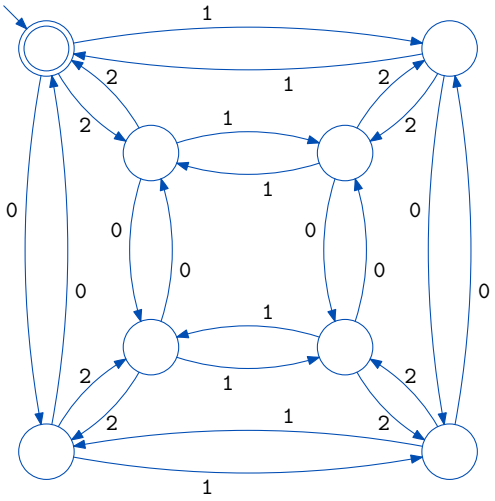
A1: For the following, build a deterministic FA. The alphabet is $\{0, 1\}$. The empty string is not in the language. If the string starts with a 0, then the string has length at least 3. If the string starts with a 1, then the last bit must be a 0.

A2: Consider the following language L with alphabet $\{0, 1, 2\}$.
Every string in L starts with a 2, ends with a 1, and contains an even number of 0's.
For example, both 201100201 and 211 are in the language.
Give both a DFA and an RE for L.

A3: Let M be the language described as follows. The alphabet is $\{0, 1\}$.
The empty string is in M. If a string starts with a 0, then it ends with a 1. If a string starts with a 1, then it does not contain 00 as a substring.
Give both a DFA and an RE for M.

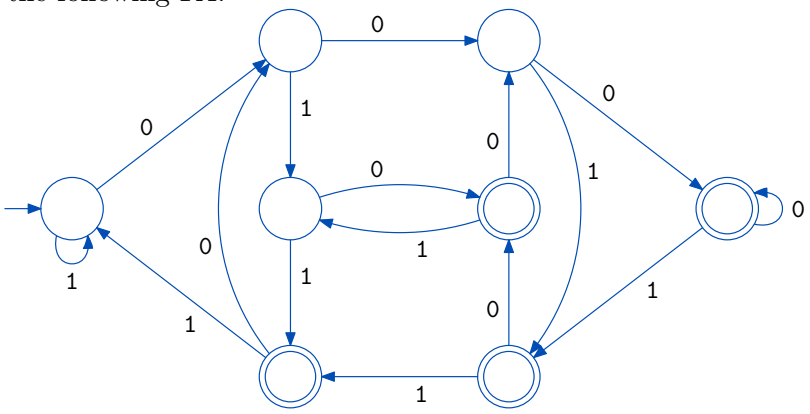
A4: Describe in succinct English what languages the following two FAs accept:





A5: Give an RE for the set of all binary strings that do not contain 101 as a substring.

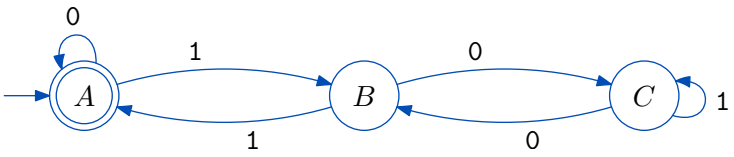
A6: Consider the following FA.



(a) Which 3-bit strings does it accept?

(b) Describe in English the language accepted by the machine.

A7: Consider the following DFA.



(a) List all 4-bit strings accepted by the machine.

(b) Give an RE for this language of the machine.

(c) Describe in English the language of this machine. (Hint: consider the strings as binary.)

A8: Let J be the language given by the RE $(\mathtt{a} + \mathtt{ba})^*$.

(a) List all strings of length 4 in J.

(b) Give an NFA that accepts J.